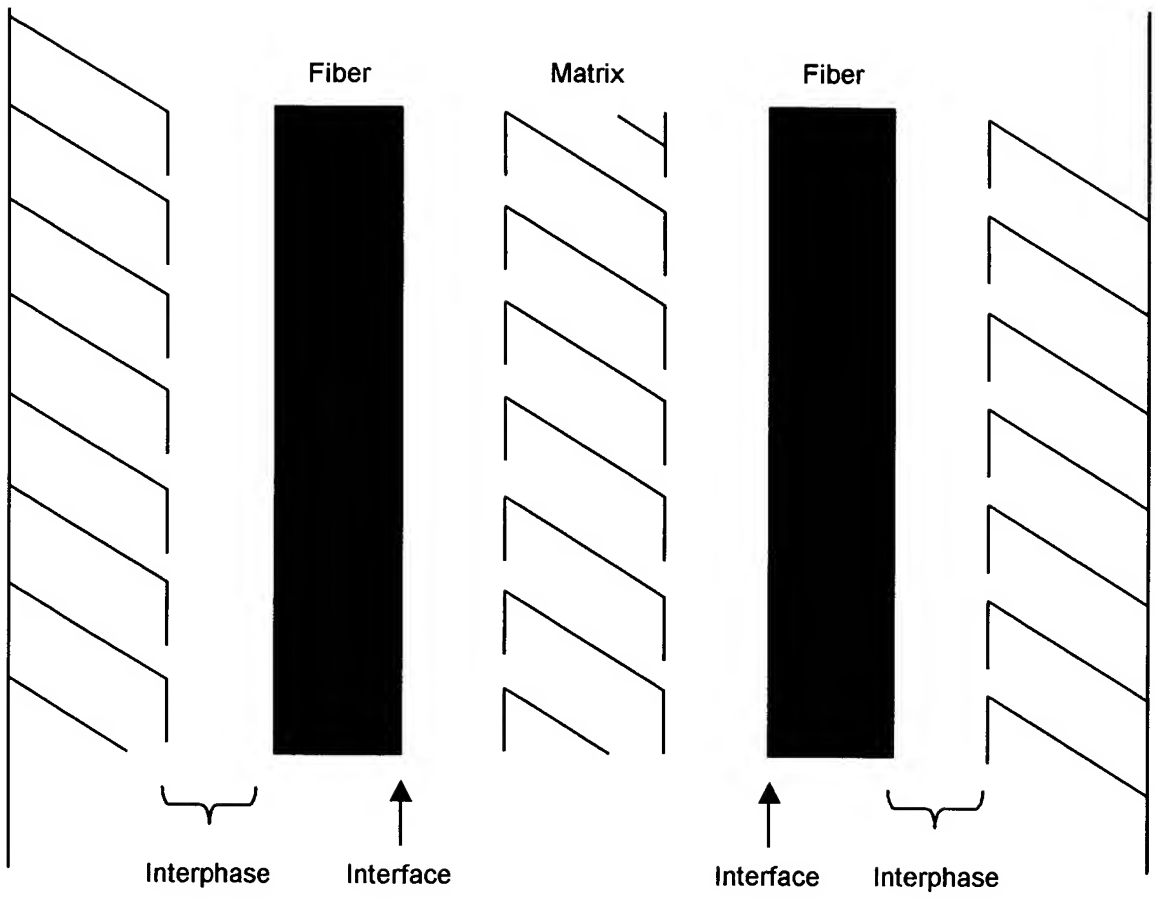
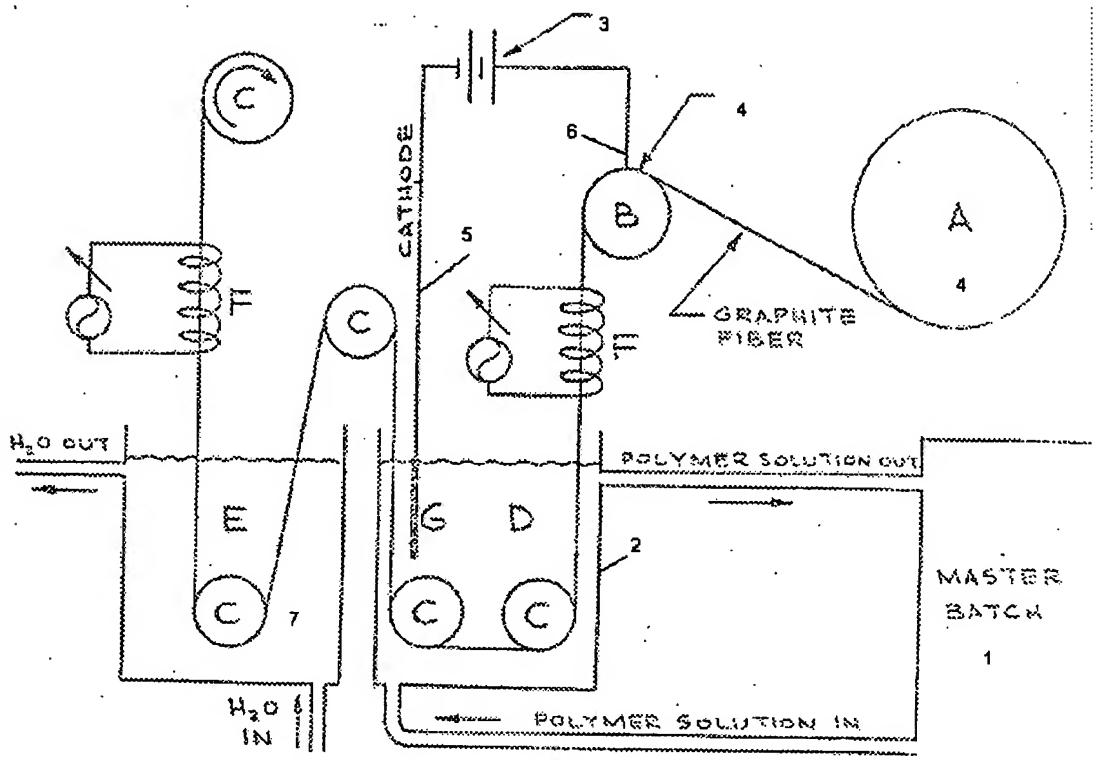


Figure 1. Fiber-Matrix Interface/Interphase in Fibrous Composite Material



A = Supply spool of graphite fiber or cloth.
B = Graphite pulley used as electrode.
C = Teflon pulleys.
D = Coating bath.
E = Wash bath.
F = Heaters used to activate fiber and subsequently cure or dry fiber/resin composite.
G = Graphite cathode.

Figure 2. Schematic of Continuous Electrodeposition onto Graphite Fibers

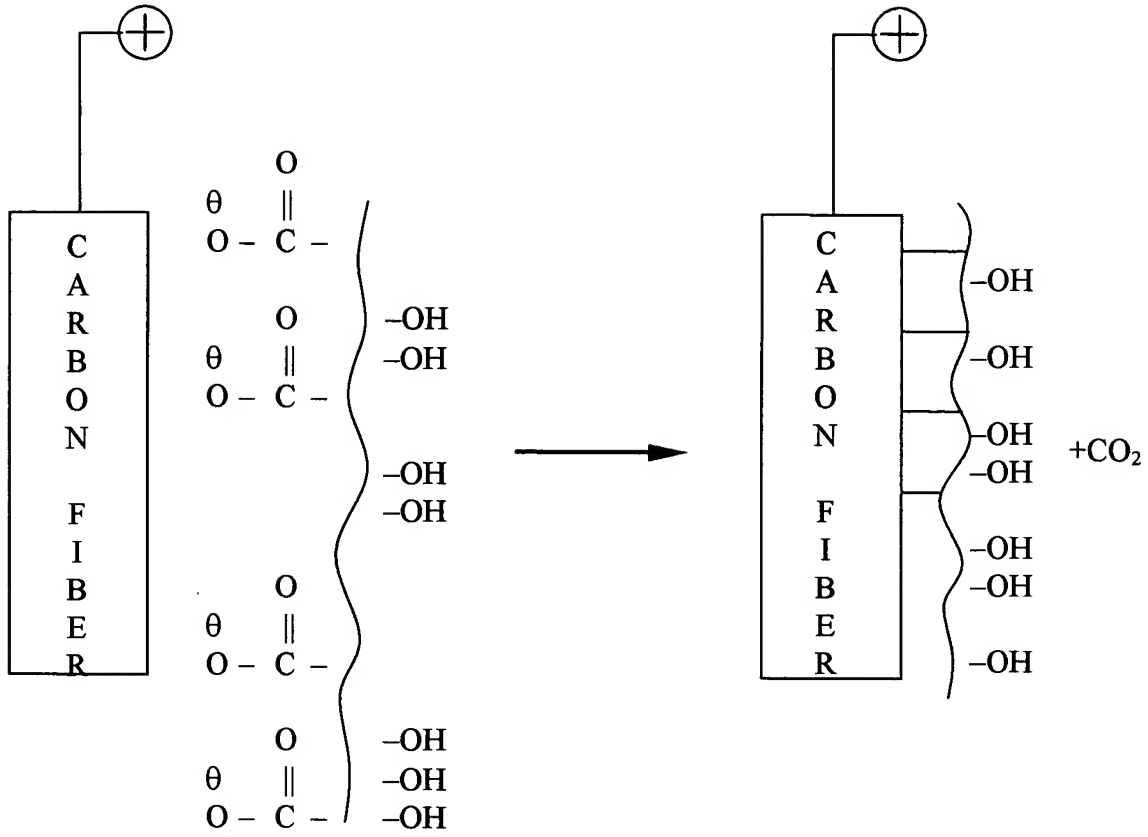


Figure 3. Electrodeposition of Carboxymethylcellulose Onto Carbon Fiber

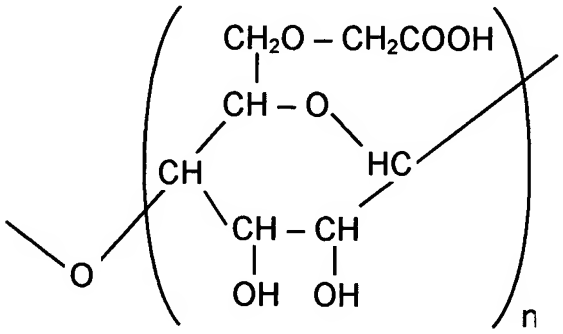


Figure 4. Carboxymethylcellulose

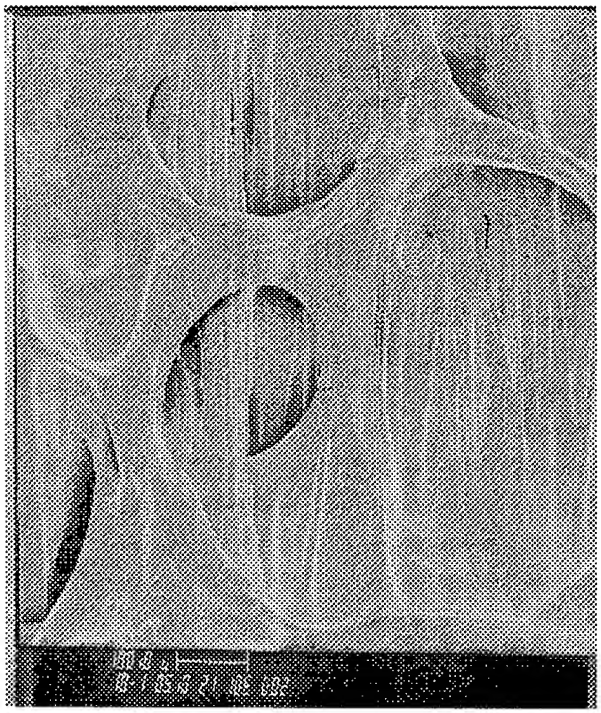


Figure 5. 100X of Electrodeposited CMC on Carbon Fibers

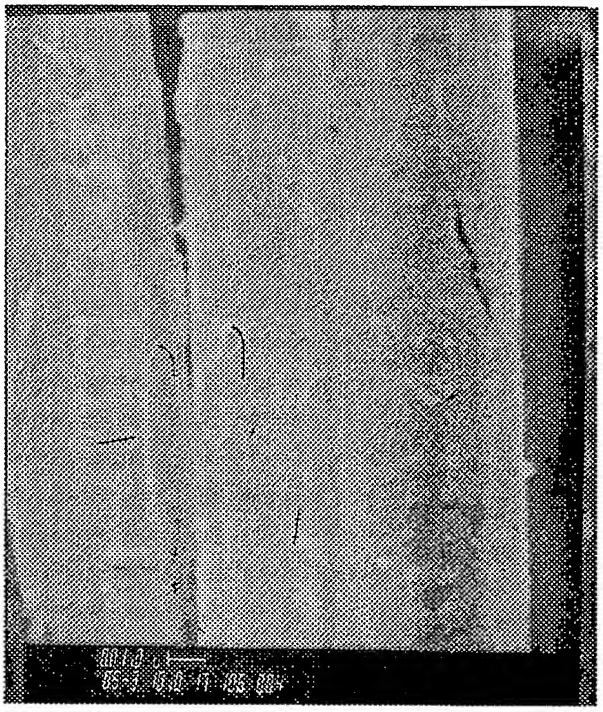


Figure 6. 5000X of Electrodeposited CMC and Washed With NaOH Solution

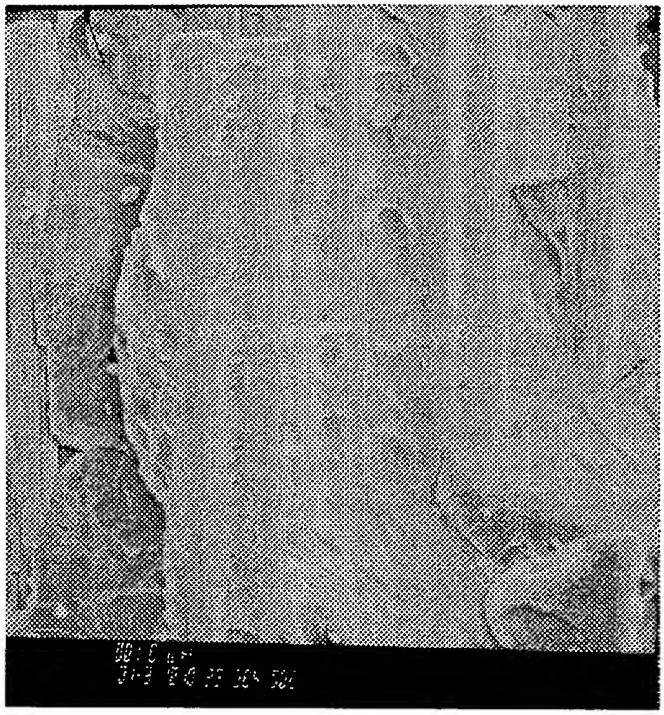


Figure 7. CMC Electrodeposited, Embedded in Epoxy and Fractured – 1000X

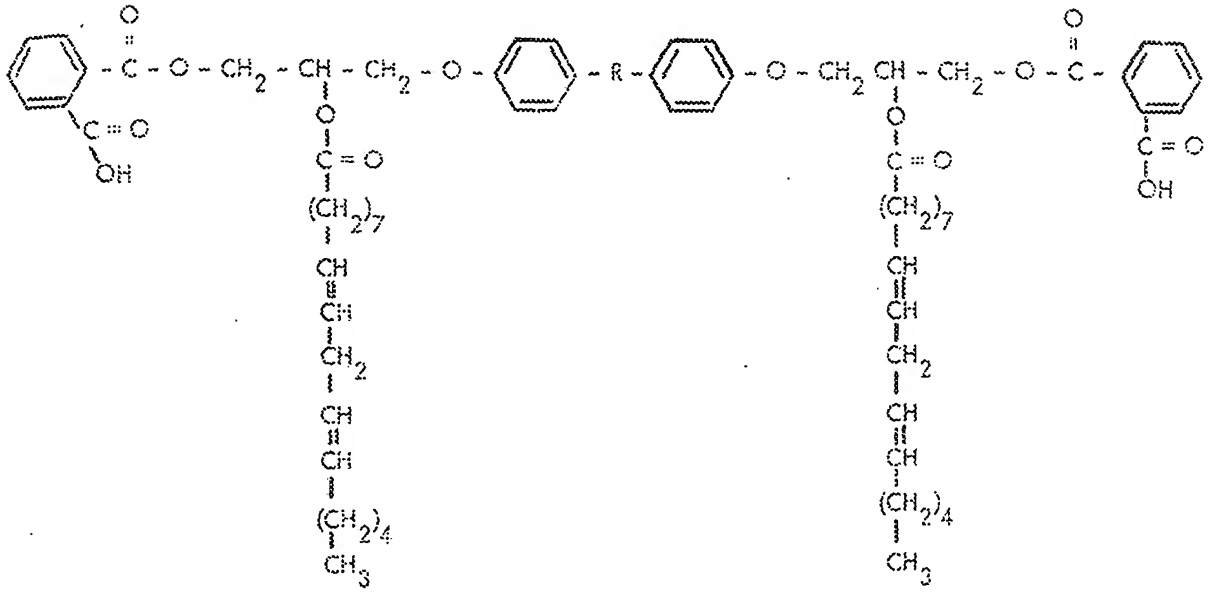


Figure 12. Generalized Structure of DX-16

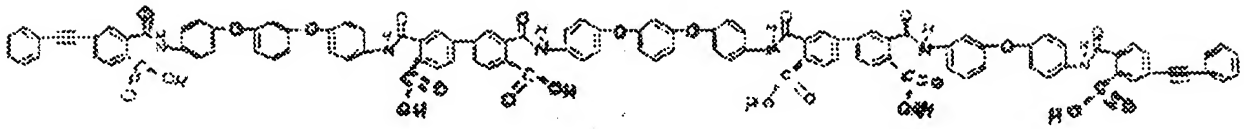


Figure 13. Polyamic Acid Precursor to PETI-298 Polyimide

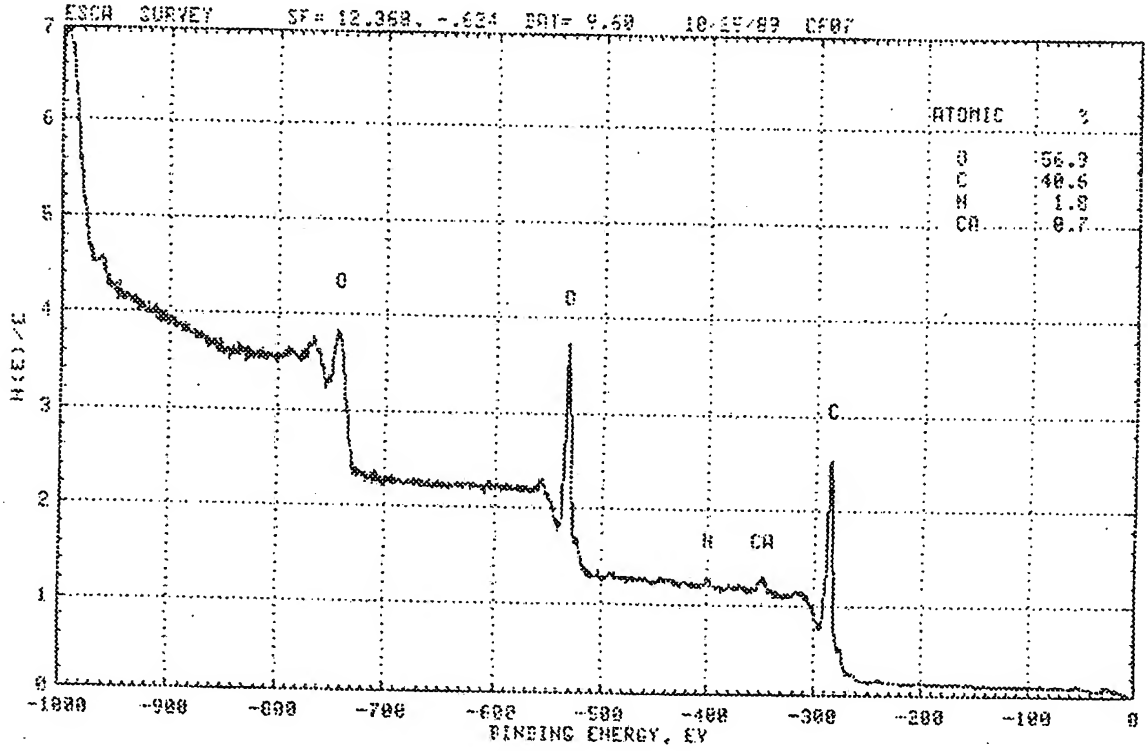


Figure 14. ESCA Survey Spectrum of Carbon Fiber (3 Nitrophthalic Anhydride)

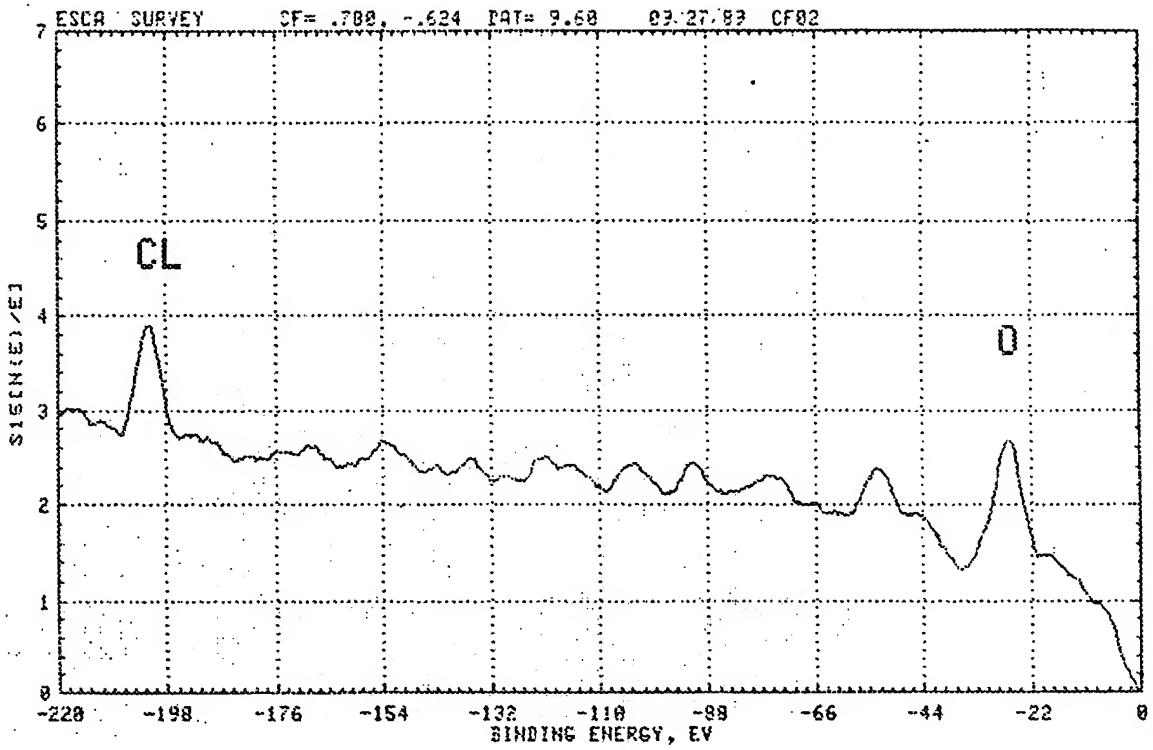


Figure 15. ESCA Spectrum – (Tetrachlorophthalic Anhydride)

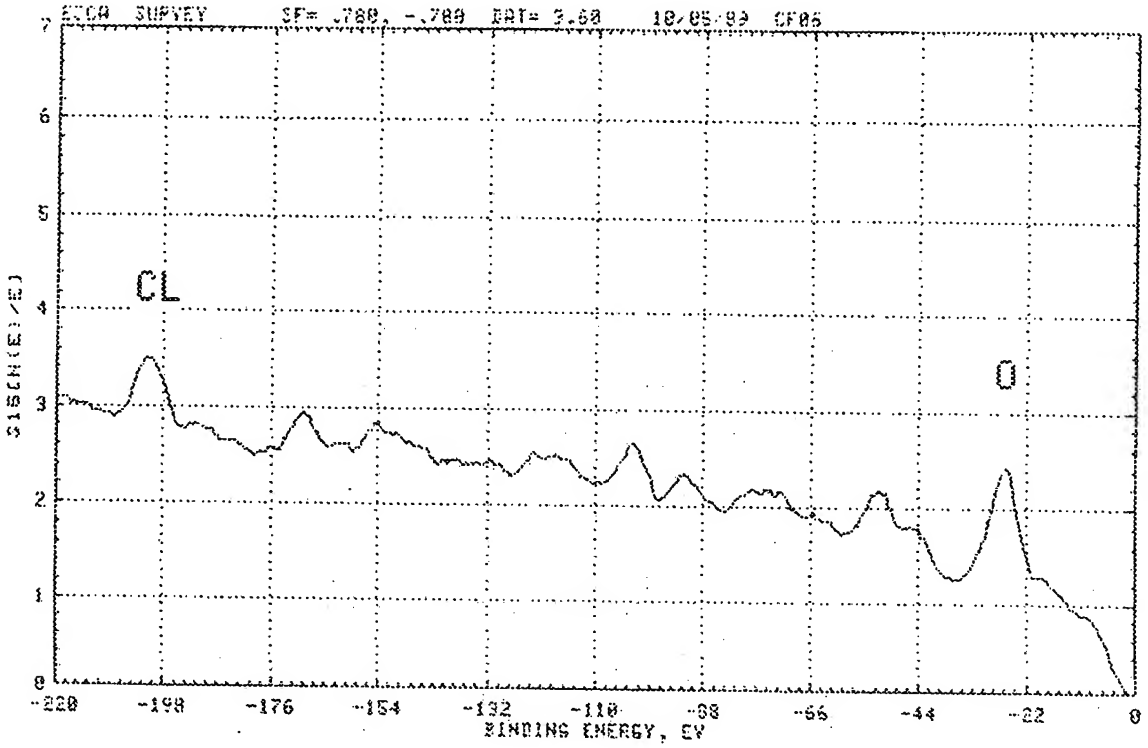


Figure 16. ESCA Spectrum – (Chloro-Maleic Anhydride)

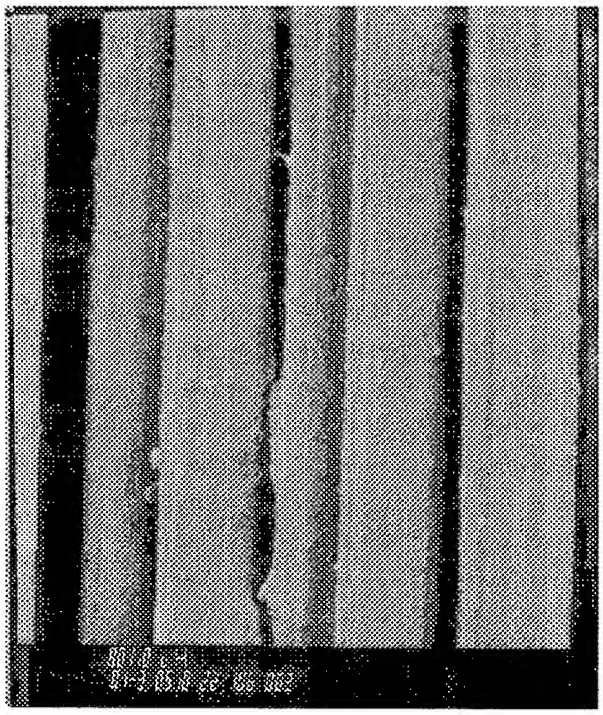


Figure 9. Styrene/Maleic Di-acid Electrodeposited on Unsized Fibers – 1000X

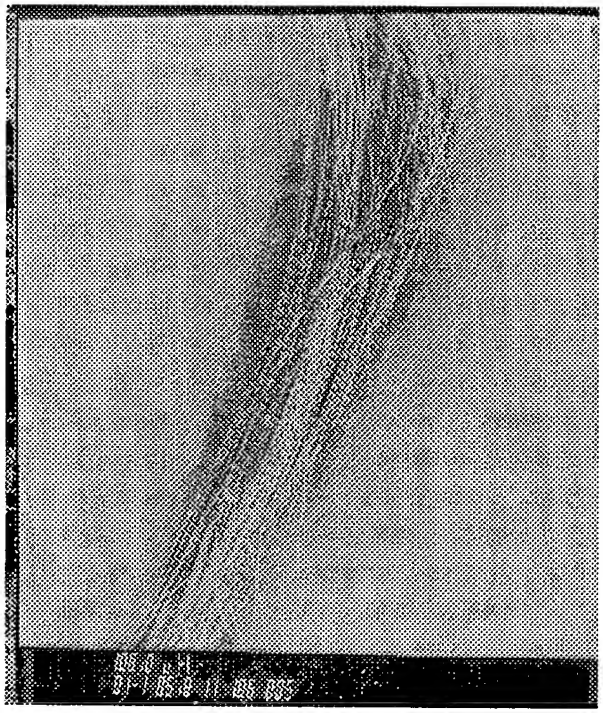


Figure 8. Styrene/Maleic Di-acid Electrodeposited on Unsized Fibers – 10X

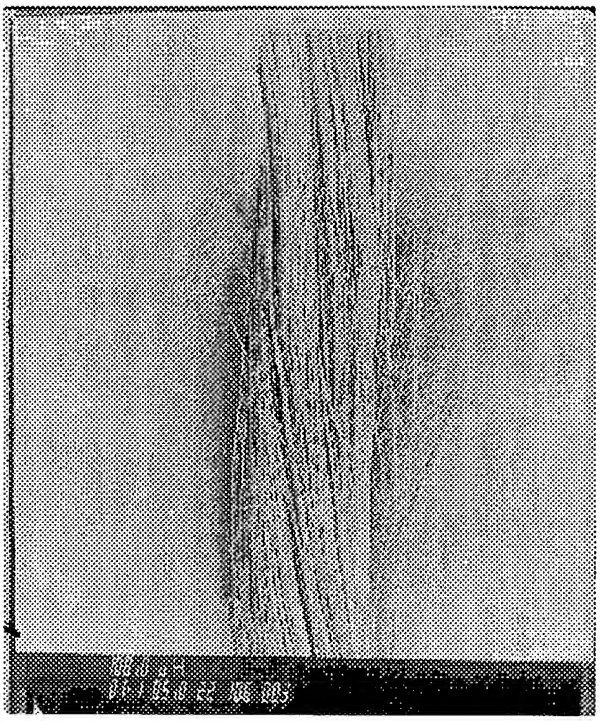


Figure 10. Caustic Treated Styrene/Maleic Di-acid Electrodeposited on Unsized Fibers – 10X

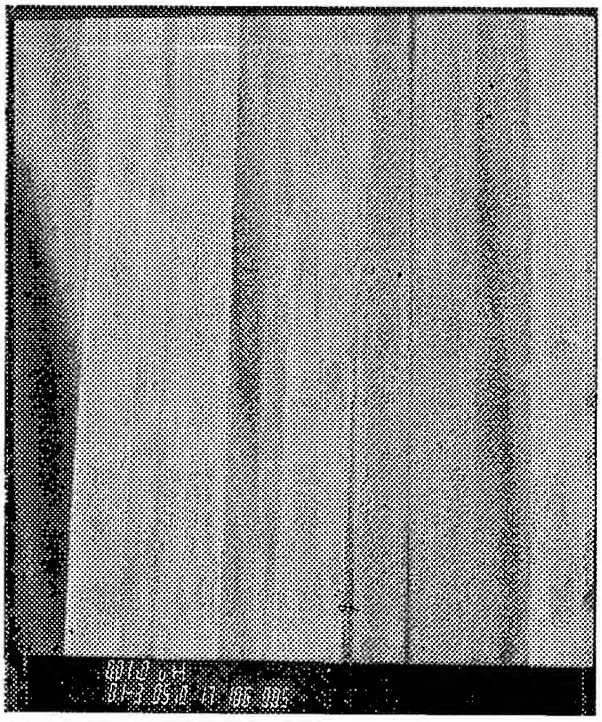


Figure 11. Caustic Treated Styrene Maleic Di-acid Electrodeposited on Unsized Fibers – 1000X

Table 2
Electrical Conductance of Anhydride-Treated CMC-Coated Fibers

Sample	Carbon Conductance Before Electrodeposition	CMC-Coated Fiber	Anhydride-CMC
4-Nitrophthalic Anhydride	640 MA	651 MA	580 MA
3-Nitrophthalic Anhydride	642 MA	650 MA	585 MA
Tetrachlorophthalic Anhydride	639 MA	626 MA	652 MA
Chloromaleic Anhydride	639 MA	615 MA	640 MA

Table 1
Electrodeposition of CMC onto Six Inches Carbon Fiber

Time	Current	Voltage (d.c.)
0	1210	20
:15	1028	20
:30	812	20
1:00	411	20
2:00	91	20
3:00	71	20